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COMPOSITION FOR PERMANENT WAVE OR STRAIGHTENING CURLY  
HAIR  
[PAAMANENTO UEIBU MATA WA SHUKUMO KYOSEI-YO SOSEIBUTSU]

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[Claim]

[Claim 1]

A permanent wave or curly hair straightening composition characterized as made up of a first agent containing a copolymer of (A) a reducing agent and (B) dimethyl diallyl chloride ammonium and acrylic acid; and a second agent containing (C) an oxidizing agent and (D) an anionic surface active agent;

[Claim 2]

A permanent wave or curly hair straightening composition as described in Claim 1 wherein the abovementioned second agent contains (E) an anionic polymer;

[Claim 3]

A permanent wave or curly hair straightening composition as described in Claim 1 or Claim 2 wherein the abovementioned first agent contains (F) an amino modified silicon polymer, a glycol modified silicon polymer as well as silicon oil;

[Claim 4]

A permanent wave or curly hair straightening composition as described in Claim 1, Claim 2 or Claim 3 wherein the abovementioned second agent further contains (G) a higher alcohol;

[Claim 5]

A permanent wave or curly hair straightening composition as described in Claim 4 wherein the abovementioned (G) higher alcohol consists of one, two or more types of higher alcohol selected from a group made up of myristyl alcohol, cetyl alcohol, stearyl alcohol and behenyl alcohol.

[Detailed Description of Invention]

[0001]

[Technical Background]

The present invention relates to a permanent wave or curly hair straightening composition. It relates more particularly to an improved permanent wave or curly hair straightening composition made up of a first agent and a second agent and which provides a smooth touch to the hair both when wet and in a dry state after the permanent wave and the curly hair has been straightened and which provides a vastly improved soft touch to the hair when dry.

[0002]

[Prior Art]

A variety of irreversible damage occurs to the hair due to the reducing action and the oxidizing action in the process for processing permanent waves and straightening curly hair. The increase in friction originating in disturbances to the cuticle layer on the surface of the hair, the sticking together of the hair and a decline in the glossiness are important factors involved in damaging the beauty of the hair and a great many technique have been test to solve these problems.

[0003]

For example, techniques have been disclosed (Examined Patent 2-12927, Unexamined Patent 56-15009, Unexamined Patent 58-150506 and Unexamined Patent 61-183214) for compounding cationic polymers in the first agent for the permanent wave and anionic surface active agent in the second agent as well as techniques (Unexamined Patent 60-8216, Unexamined Patent 2-183214) which apply silicon polymers.

[0004]

[Problems Which the Present Invention is Intended to Solve]

However, in the former technique, when complexes made up of cationic polymers and anionic surface active agents were formed on the surface of the hair, the hair was provided with a smooth touch when the hair was wetted with water. However, the hair was stiff to the touch when the hair was dry making it unacceptable.

[0005]

There were also problems with the technique which applied silicon polymers, the hair was somewhat lacking in smoothness. The hair was too dry in its dry state, became hard and crisp and was lacking in smoothness.

[0006]

After a great deal of research was carried out on solving the problems in the prior art techniques by processing permanent waves and straightening curly hair from the abovementioned vantage point, the inventors found that when permanent waves were carried out and curly hair was straightened using a composition made up of a first agent containing copolymers of (A) a reducing agent, (B) dimethyl diallyl chloride ammonium and acrylic acid, (C) a

second agent and (D) an anionic surface active agent, the hair was extremely smooth to the touch both when dry and when wet and the hair was smooth to the touch when dry and they achieved the present invention.

[0007]

It is an object of the present invention to provide a permanent wave or curly hair straightening composition which remarkably improves the smoothness of the hair when wet after the permanent wave and curly hair straightening and which provides the hair with a soft touch when wet and a smooth touch when dry.

[0008]

[Means Used to Solve the Problems]

The present invention provides a permanent wave and curly hair straightening composition characterized as made up of a first agent containing (A) a reducing agent and (B) a copolymer of (B) dimethyl diallyl chloride ammonium and acrylic acid and a second agent containing (C) an oxidizing agent and (D) an anionic surface active agent.

[0009]

It is another object of the present invention to

provide the abovementioned permanent wave or curly hair straightening composition wherein the abovementioned second agent contains (E) an anionic polymer.

[0010]

It is yet another object of the present invention to provide the abovementioned permanent wave or curly hair straightening composition wherein the abovementioned first agent contains (F) amino modified silicon polymers, glycol modified silicon polymer and silicon oil.

[0011]

It is still another object of the present invention to provide the abovementioned permanent wave or curly hair straightening composition wherein the abovementioned second agent contains (G) a higher alcohol.

[0012]

It is yet another object of the present invention to provide the abovementioned permanent wave or curly hair straightening composition wherein the abovementioned (G) higher alcohol is one, two or more types of higher alcohol

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selected from a group made up of myristyl alcohol, cetyl alcohol, stearyl alcohol and behenyl alcohol.

[0013]

[Mode of Working the Invention]

Next, we shall provide a detailed description of the configuration of the present invention.

[0014]

There are no particular restrictions on the reducing agent for constituent (A) used in the first agent in the present invention as long as it is a reducing agent which can be usually used for a permanent wave agent. Examples are: thioglycolic acid, thiolactic acid and salts thereof, cysteine or salts thereof, N-acetyl cysteine, sulfite and hydrogensulfite and the like.

[0015]

Specific suitable examples of the reducing agent are: thioglycolic acid, thioglycolic acid ammonium, thioglycolic acid monoethanol amine, thioglycolic acid isopropanol amine, thioglycolic acid lysine, thioglycolic acid arginine, thiolactic acid, thiolactic acid ammonium,

thiolactic acid monoethanol amine, thiolactic acid isopropanol amine, thiolactic acid lysine, thiolactic acid arginine, L-cysteine, DL-cysteine, L-cysteine hydrochloride, DL-cysteine hydrochloride, N-acetyl-L-cysteine, N-acetyl-DL-cysteine, sodium sulfite, sodium hydrogensulfite, ammonium sulfite, ammonium hydrogensulfite, sulfite monoethanol amine and hydrogensulfite monoethanol amine and the like.

[0016]

One, two or more types of these reducing agents may be used in combination and the amount of reducing agent contained should be 1 to 15 wt % and preferably 2 to 10 wt % for the first agent.

[0017]

It is sometimes advantageous to add dithioglycolic acid which is a conjugate oxidizing agent, dithiolactic acid or salts thereof, L-cysteine and cysteine derivatives to adjust the reducing power of these reducing agents.

[0018]

In general, the higher the pH of the first agent, the stronger the action of these reducing agents. However, in

the present invention, the pH should be adjusted to 6.0 to 10.0 and preferably 6.5 to 9.5.

[0019]

The number-average molecular weight of the copolymer of the dimethyl diallyl chloride ammonium and the acrylic acid of constituent (B) of the first agent in the present invention is within the range of 100,000 to 10,000,000 and a Macote 280 (copolymer consisting of approximately 80 % of dimethyl diallyl chloride ammonium and approximately 20 % of acrylic acid, number-average molecular weight of approximately 2,000,000, manufactured by Calgon Corp.), Macote 295 (copolymer consisting of approximately 95 % of dimethyl diallyl chloride ammonium, number-average molecular weight of 500,000, manufactured by Calgon Corp.) and other commercially available products can be used.

[0020]

One, two or more types of these copolymers may be used in combination and the amount of the copolymer compounded should be 0.1 to 5.0 wt % and preferably 0.5 to 3.0 wt %.

[0021]

There are no particular restrictions on the oxidizing agent for constituent (C) used in the second agent in the present invention as long as it is an oxidizing agent which can be usually used for a wave agent. For example, sodium bromate, potassium bromate, sodium perborate and a hydrogen peroxide solution and the like may be used.

[0022]

One, two or more types of these oxidizing agents may be used in combination. The amount of oxidizing agent contained should be compounded at 0.5 to 15 wt % and preferably 1.5 to 10 wt % in the second agent.

[0023]

The anionic surface agent for constituent (D) used in the second invention in the present invention is a surface active agent wherein at least part of the anionic hydrophilic part contains at least one  $-\text{OSO}_3^-$  group,  $-\text{SO}_3^-$  group or  $-\text{COO}^-$  group. Examples are alkyl sulfate, alkyl ether sulfate, alkyl sulfonate, alkyl benzene sulfonate, alkyl taurate, alkyl N-methyl taurate, alkyl sulfosuccinic acid, alkyl ether sulfosuccinic acid,

alkyl sarcosinate, alkyl ether carboxylate, alkyl phosphate, alkyl ether phosphate and the like.

[0024]

Suitable anionic surface active agents are sodium lauryl sulfate, ammonium or mono-, di-, triethanol amine, polyoxy ethylene ether sodium sulfate,  $\alpha$ -olefin sulfonate, coconut aliphatic methyl-N-taurine sodium, N-myristoyl methyl N-taurine sodium, sodium lauryl sulfonate, lauryl polyethylene glycol sodium sulfosuccinic acid (1 to 3 ethylene oxide adducts), N-cocoyl potassium "daltamic" [as transliterated] acid, sodium, dodecane-1,2-ether sodium diolate, lauryl sodium phosphate and lauryl ether sodium phosphate and the like.

[0025]

One, two more types of these anionic surface active agents may be used in combination. The amount contained should be compounded at 0.1 to 5.0 wt % and preferably 0.5 to 3.0 wt %.

[0026]

The anionic polymer in constituent (E) used in the second agent in the present invention may be an acrylic

acid polymer; methacrylic acid polymer; acrylic acid · methacrylic acid copolymer; acrylic acid · methacrylic acid alkyl copolymer; maleic acid · butylene copolymer; maleic acid alkylene copolymer; carboxy vinyl polymer; and a carboxy modified silicon polymer.

[0027]

One, two or more types of these anionic polymers may be used in combination and the amount contained in the second agent should be 0.01 to 5.0 wt % and preferably 0.05 to 1.0 wt % for vinyl group polymers; and 0.05 to 4.0 wt %

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for carboxyl denatured silicon copolymers.

[0028]

The amino modified silicon polymer, glycol modified silicone polymer or silicone oil of constituent (F) used in the first agent in the present invention is compounded as an emulsified product or microemulsion and should be compounded in the first agent at a content of 0.1 to 10.0 wt % and preferably 0.5 to 5.0 wt %.

[0029]

There are no particular restrictions on the higher alcohol of constituent (G) used in the second agent in the present invention, however, one type or a combination of two or more types of myristyl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol.

[0030]

The amount of higher alcohol contained in the second agent should be 0.1 to 20 wt %; when agent 2 is a liquid, the content should be 0.5 to 3.0 wt %; when agent 2 is creamy, the content should be 3.0 to 15 wt %.

[0031]

A nonionic surface active agent should be compounded by adding it to constituent (D) indicated above in order to compound these higher alcohols to best advantage and stably.

[0032]

A suitable nonionic surface active agent may be a polyoxyethylene alkyl ether; (for example, polyoxyethylene lauryl ether, polyoxyethylene myristyl ether, polyoxyethylene cetyl ether, polyoxyethylene oleyl ether,

polyoxyethylene stearyl ether, polyoxyethylene isostearyl ether), mono fatty acid glycerol esters, mono fatty acid sorbitane esters, fatty acid monoethanol amide, fatty acid diethanol amide and the like.

[0033]

Constituents regularly used for hair treatment cosmetics such as water, alcohol, alkali agent, oil and fats, mineral oils, a variety of ester oils, higher branching alcohols, higher unsaturated alcohols, silicone oil, emulsifiers, solubilizers, buffers, fragrances, coloring matters, preservatives, metal ion sealing agents, pH regulators, amino acids and peptides and other hair protection agents and solvents and the like may be prepared using the conventional method for the composition for compounding the permanent wave or curly hair straightening in the present invention as long as the effect of the present invention is not adversely affected.

[0034]

The composition for compounding the permanent wave or curly hair straightening in the present invention can be used for a cold two-bath type, heated two-bath type permanent wave agent or curly hair straightening agent.



[0035]

[Practical Examples]

Next, we shall explain the present invention more specifically by providing practical examples of it. However, it should by no means be construed that the present invention is restricted to these practical examples.

[0036]

We adjusted the first agent and the second agent of the composition for permanent wave indicated in [Practical Examples 1 through 6, Comparative Examples 1 through 4] and [Table 1] and [Table 2]. We evaluated the effect of the present invention by carrying out the following tests for hair friction and touch of the hair when processing the permanent wave by combining [Table 3] and [Table 4]. Results are indicated in [Table 3] and [Table 4].

[0037]

(Method of Testing Hair Friction)

Hair: we immersed undamaged hair which had not been chemically permed, tinted or bleached in a 0.5 % lauryl sodium sulfate aqueous solution. We set it aside so that it

was still for 30 minutes at 40°C. Then, we washed it thoroughly in flowing water and air-dried it by setting it aside in the room so that it was still. We aligned the hair roots and orientation of the hair ends for 40 of these hair fibers, bonded the parts of the hair roots and produced a tangle of hair.

[0038]

#### <Hand Contact Friction Measurement>

We used a model M430-M1 hair friction force measuring device (made by Nikkei Densoku Ltd.) for this. We mounted an NBR ring on the roller part of the measuring device, clamped the tangle of hair in this roller and while turning the roller at 2 rpm, we measured the tensile force applied to the tangle of hair. We carried out measurements before and after the perm treatment and while dangling one centimeter of the hair tangle, measured it in 4 places. We measured the hair in two conditions, when dry (24±1°C, 60±5 %RH) and when it was wet and calculated the hair contact friction using the following formulas.

Hand contact friction = [tensile force (g) applied on tangle of hair after perm treatment] / tensile force (g) applied on unpermed tangle of hair]

Hand contact friction= 1: no change in friction before and

after treating with permanent agent.

Hand contact friction <1: when friction declined due to treatment with permanent agent.

Hand contact friction >1: when friction increased due to treatment with permanent agent.

When we carried out treatment using a combination of permanent agent 1 and permanent agent 2, we used agent 1 for 10 minutes at 30°C and agent 2 was for 10 minutes at 30°C. n = 4 sites x 4 strands of hair = 16 and the mean value is indicated in [Table 1]

[0039]

[Method of Testing Hair Touch]

Tangle of hair: we bundled 20 cm, 3 g, of the same hair as was used to measure the friction, bonded the hair roots and produced a tangle of hair. We treated this tangle of hair using agent 1 at 30°C for 10 minutes and agent 2 at 30°C for 10 minutes. We provided for the following sensory evaluation and carried out sensory evaluation of the smoothness (creaking and combing) of the hair treated as well as the softness when the hair was touched.

[0040]

<Determination of Smoothness (creaking and combing)>

The creaking and combing when the tangle of hair was dry when it had been permed as indicated above and when it had been wetted in water was determined by a panel of four. The criteria were evaluated in five steps by using the mean value of the points of the criteria given by the panel which had been rounded off to two decimal points.

Evaluation point 1: Considerably more creaking than untreated hair and combing was rather poor.

Evaluation point 2: more creaking than with the untreated hair and combing was poor.

Evaluation point 3: Somewhat smoother than the untreated hair and the combing was somewhat good.

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Evaluation point 4: Smoother and softer than the untreated hair and combing was good.

Evaluation point 5: Much smoother and softer than the untreated hair and combing was quite good.

X : Average of evaluation points: less than 1.5

Δ : Average of evaluation points: more than 1.5 and less than 2.5

O : Average of evaluation points: more than 2.5 and less than 3.5

© : Average of evaluation points: more than 3.5 and less than 4.5

Star : Average of evaluation points: 4.5 and above.

[0041]

<Determination of Moistness>

After determining the abovementioned creaking and combing, we immersed the tangle of hair in 40°C hot water for 10 minutes and then hung it in the room and air-dried it for 30 minutes (23°C, 55 % RH). Determination was carried out by a panel of 4. The determination criteria involved evaluation in the following four steps of the average value of the following evaluation points in the criteria by the panel which had been rounded off to two decimal places.

Evaluation point 1: Considerably drier than the untreated hair and felt hard to the touch.

Evaluation point 2: Somewhat drier than the untreated hair.

Evaluation point 3: Somewhat moister than the untreated hair, was soft to the touch.

Evaluation point 4: More moist than the untreated hair and was resilient.

X: Average of evaluation points: less than 1.5

Δ: Average of evaluation points: more than 1.5 and less

than 2.5

○: Average of evaluation points: more than 2.5 and less

than 3.5

◎: Average of evaluation points: more than 3.5

[0042]

[Table 1]

Composition of First Agent (W/V%)	No. 1	No. 2	No. 3	No. 4
thioglycolic acid ammonium (50 %)	13.5 g	13.5	13.5	13.5
monoethanol amine	2.0	2.0	2.0	2.0
ammonium hydrogencarbonate	1.0	1.0	1.0	1.0
Macote 100 (40 %)*1	--	2.0	--	--
Macote 295 (40 %) *2	--	--	2.0	2.0
Toray silicon SM8704C*3	--	--	--	4.0
purified water	Residue	Residue	Residue	Residue
Total (mL)	100.0	100.0	100.0	100.0

\*1: Macote 100 (diallyl dimethyl chloride ammonium polymer;

approximately 40% aqueous solution, commercially

available from Calgon Corp.)

\*2: Macote 259 (copolymer of diallyl dimethyl chloride

ammonium and acrylic acid; approximately 40 % aqueous

solution; commercially available from Calgon Corp.)

\*3: Toray Silicon SM8704C (aqueous emulsion containing

approximately 40 % amino modified silicon; commercially

available from Calgon Corp.)

[0043]

Composition of Second Agent (W/V%)	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
sodium bromate	6.0	6.0	6.0	6.0	6.0	6.0
Alscope AP-30*4	--	1.0	1.0	1.0	0.5	0.5
Pemulene TP-2*5	--	--	0.2	--	0.2	--
Toray Silicon BY22-840*6	--	--	--	2.0	--	2.0
cetostearyl alcohol 4060	--	--	--	--	0.2	0.2
polyoxyethylene oleyl ether						
(20E.0.)	0.1	0.1	0.1	0.1	0.1	0.1
purified water	Balance	Balance	Balance	Balance	Balance	Balance
Total (mL)	100.0	100.0	100.0	100.0	100.0	100.0

\*4: Alscope AP-30 (approximately 30 % aqueous solution of polyoxyethylene (3E.0) lauryl ether sodium sulfate; commercially available from Toho Chemical Ltd.)

\*5: Pemulene TR-2 (acrylic acid · methacrylic acid alkyl

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copolymer; commercially available from Nikko Chemicals Ltd.; made by BF Goodrich)

\*6: Toray Silicon BY22-840 (aqueous microemulsion containing a 30 % emulsion of carboxy modified silicon; made by Toray · Dow Corning Ltd.)

[0044]

[Evaluation Using Combination of First Agent/Second Agent]

[Table 3]

	Comparative Example	Comparative Example	Comparative Example
	1	2	3
First Agent	No. 1	No.2	No.3
Second Agent	No. 1	No.2	No.1
Friction Measurement (hand touch test)			
[wet]	1.57	0.91	1.03
[dry]	1.35	1.21	1.07
Touch Determination [sensory test]			
Smooth (creaking/combing)	X	O	O
[wet]	X	Δ	Δ
[dry]			
Smoothness			
[dry]	X	X	X

<b>Practical Ex. 1</b>	<b>Practical Ex. 2</b>	<b>Practical Ex. 3</b>	<b>Practical Ex. 4</b>	<b>Practical Ex. 5</b>	<b>Practical Ex. 6</b>
No.3	No.4	No. 4	No. 4	No. 4	No. 4
No. 2	No. 2	No. 3	No. 4	No. 5	No. 6
0.80	0.73	0.55	0.50	0.48	0.37
0.88	0.82	0.60	0.64	0.52	0.44
©	©	star	star	star	Star
○	©	©	©	©	©
○	○	©	©	©	©



[0045]

[Table 4]

	<b>Practical Example 7</b>	<b>Practical Example 8</b>	<b>Practical Example 9</b>	<b>Practical Example 10</b>
First Agent	No. 3	No.3	No.3	No.3
Second Agent	No.3	No.4	No. 5	No.6
Friction Measurement (touching friction)				
[wet]	0.75	0.65	0.56	0.44
[dry]	<b>0.85</b>	<b>0.73</b>	<b>0.68</b>	<b>0.51</b>
Touch Determination (Sensory Test)				
Smoothness [creaking / combing]				
[wet]	⊙	star	star	star
[dry]	0	⊙	⊙	⊙
Softness				
[dry]	0	⊙	⊙	⊙

[0046]

As can be seen from Table 3 and Table 4, the practical examples of the present invention had hand touching friction [wet], [dry], smoothness [wet], [dry] and softness

[dry] were considerably improved compared to the Comparative Examples. It is clear that the touch and friction involving the hair were improved by compounding Macote 295 in the first agent and Alscope AP-30 in the second agent. However, it is indicated that the touch and friction of the hair were further improved by additionally

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compounding Toray Silicon SM8704C in the first agent and Pemulene Tr-2, Toray · Silicon BY22-840 and cetostearyl alcohol in the second agent.

[0047]

We produced the first agent and the second agent for the cold bath type permanent wave indicated in Practical Example 11 indicated below.

# First Agent

Composition		Amount Compounded (W/V%)
No.1	thioglycolic acid ammonium (50%)	16.0 g
No. 2	dithioglycolic acid diammonium (40 %)	3.8 g
No.3	aqueous ammonium test drug class (28%)	1.5 g
No. 4	monoethanol amine	1.0 g
No.5	ammonium hydrogencarbonate	1.5 g
No.6	Macote 280	2.0 g
No.7	Toray silicon BY22-010	2.0 g
No.8	EDTA-2Na	0.1 g
No.9	Polyoxyethylene (20E.0) lauryl ether	0.3 g
No.10	Fragrance	0.1 g
No.11	purified water	Balance

Total 100.0 mL

No 6: Macote 280 (approximately 40 % aqueous solution of a copolymer of diallyl dimethyl chloride ammonium 80 %) and acrylic acid (20 %); commercially available from Calgon Corp.)

No. 7: Toray • Silicon BY22-010 (aqueous emulsion containing polydimethyl siloxane; commercially available from Toray • Dow Corning Ltd.)

## [Method of Production]

We gradually added No. 1, No. 2, No. 3, No. 4, No. 5, No. 6 and No. 8 to approximately 50 g of No. 11. Separately

from this, we added No. 9 to approximately 10 g of No. 11, added No. 10 and heated it and dissolved it and mixed it until it was clear. Then, we added this part to the previous main part, added No. 3 and No. 7 and stirred it until it was uniform. Last of all, we added No. 11 so that it was 100 mL in its entirety. We obtained a first agent which was transparent and stable.

[0048]

#### Second Agent

Composition		Amount Compounded (W/V%)
No.1	sodium bromate	7.0 g
No. 2	potassium phosphate	0.5 g
No.3	caustic soda	0.2 g
No. 4	Alscope SP-40	1.5 g
No. 5	Hibice Wacoh 104	0.3 g
No. 6	Polyoxyethylene (20E.0.) oleyl ether	0.5 g
No. 7	purified water	Balance

Total 100.0 ml

No.4: Alscope SP-40 (aqueous solution containing approximately 40 % of lauryl sodium sulfate; commercially available from Toho Chemical Ltd.)

No.5: Hibice Wacoh-104 (carboxy vinyl polymer: commercially available from Wako Junyaku Ltd.)

[Method of Production]

We added No.1, No. 2 and No. 4 to approximately 50 g of No. 7 and stirred it (Part 1). We added No. 5 to approximately 30 g of No. 7 and stirred it. Added No. 3 and stirred it until it formed an overall uniform gel shape. We added No. 6 to approximately 10 g of No. 7 and stirred it while heating and dissolving it (Part 3). We combined Part 1 and Part 2 and stirred it until it was completely transparent and uniform. Last of all, we added the balance of No. 7, bringing it to 100.0 mL overall and stirred it again. We obtained the second agent which was transparent and had a stable viscosity.

[0049]

[Effect]

We coated approximately 1 mL of the first agent on a tangle of hair (3 g, 20 cm) and wound it around an "ever-rod" using a winding paper. We coated 2 mL of the first agent at room temperature after 10 minutes had elapsed

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(24°C, 60 % RH) and set it aside so that it was still for 10 minutes. We washed it for 3 minutes in flowing water at approximately 40°C. After towel drying it lightly, we coated 3 mL of the second agent uniformly and set it aside

to that it was still for 10 minutes at room temperature. We removed the rod, washed the tangle of hair in flowing water at approximately 40°C, towel-dried it lightly and then hung it up at room temperature and air-dried it. The waved hair obtained had a uniform resilience, it was extremely smooth when both wet and dry and was soft and smooth to the touch.

[0050]

[Practical Example 13]

We produced the first agent and the second agent for the cold two-bath type permanent wave indicated as follows.

First Agent

Composition		Amount Compounded (W/V%)
No. 1	thiolactic acid ammonium (60 %)	10.0 g
No. 2	thiolactic acid monoethanol amine (40 %)	10.0 g
No. 3	dithiodilactic acid diammonium (40 %)	2.5 g
No. 4	monoethanol amine	2.0 g
No. 5	L-arginine	1.0 g
No. 6	Macote 295	3.0 g
No. 7	Toray silicon SM8704C	2.0 g
No. 8	EDTA 3Na	0.1 g
No. 9	polyoxyethylene (15E.0) cetyl ether	0.3 g
No. 10	fragrance	0.2 g
No. 11	purified water	Balance

No. 6: Macote 295 (approximately 40 % aqueous solution of

copolymer of diallyl dimethyl chloride ammonium  
(95 %) and acrylic acid (5 %); commercially  
available from Calgon Corp.)

No. 7: Toray • Silicon SM8704C: aqueous solution containing  
approximately 40 % of amino modified silicon  
(commercially available from Toray • Dow Corning  
Ltd.)

[Method of Production]

We added No.1, No. 2, No. 3, No. 4, No. 5, No. 6 and  
No. 8 to approximately 60 g of No. 11 and stirred and  
dissolved it uniformly. (Part 1).

We added No.9 to approximately 10 g of No. 11, added No.  
10, stirred it and dissolved it so that it was clear (Part  
2).

We added Part 2 to Part 1 and while stirring added No. 7  
Last of all, we added the balance of No. 11 bringing it to  
100.0 mL overall. We stirred it again. We obtained the  
first agent which was uniform, milky white and stable.

[0051]

Second Agent

Composition		Amount Compounded (W/V%)
No. 1	sodium bromate	8.0 g
No. 2	potassium phosphate	0.1 g
No. 3	disodium phosphate	0.2 g
No. 4	Niccol CMT-30	1.5 g
No. 5	purified water	Balance

No. 4: Niccol CMT-30 (aqueous solution containing approximately 30 % of coconut oil fatty acid methyl sodium tauride; commercially available from Nikko Chemicals Ltd.)

[Method of Production]

We added No. 1, No. 2, No. 3 and No. 4 to approximately 80 g of No. 6, stirred it and dissolved it so that it was uniform. We further added No. 5, added the balance of No. 6, stirred it and adjusted it until it was 100.0 mL overall. The second agent obtained was milky white and stable.



[0052]

[Effect]

We coated approximately 1 mL of the first agent onto a bunch of hair (3 g, 20 cm) and wound it around an "ever rod" using a winding paper. After approximately 10 minutes had elapsed at room temperature (24°C, 63 % RH), we coated 2 mL of the first agent and set it aside so that it was still for 10 minutes. We washed it for 3 minutes in flowing water at approximately 40°C and lightly towel-dried it. Then, we coated 3 mL of the second agent uniformly and set it aside so that it was still for 10 minutes at room temperature. We removed the rod and washed the bunch of hair in flowing water at approximately 40°C. We lightly towel-dried it, hung it up inside the room and then air-dried it. The wave obtained was uniform and resilient, it was extremely soft and pliant both when wet and dry. It was smooth when dry and the permanent wave had a considerable luster.

/9

[0053]

[Practical Example 13]

We produced the first agent and second agent for the heated two-bath type permanent wave as follows.

## First Agent

Composition		Amount Compounded (W/V %)
No. 1	DL-cysteine hydrochloride	6.5 g
No. 2	N-acetyl-L-cysteine	1.5 g
No.3	thioglycolic acid ammonium (50 %)	2.0 g
No.4	monoethanol amine	3.5 g
No. 5	Macote 295	1.0 g
No. 6	EDTA-3Na	0.5 g
No. 7	purified water	Balance

No. 5: Macote 295 (approximately 40 % aqueous solution of copolymer of diallyl methyl chloride ammonium (95 %) and acrylic acid (5 %); commercially available from Calgon Corp.)

No.7: we added No. 1, No. 2, No. 3, No. 4, No. 5 and No. 6, to approximately 80 g of No. 7, stirred it and dissolved it evenly. We added No. 7 to complete the balance bringing it to 100.0 mL overall and obtained the first agent (No.9) which was uniform, clear and stable.

[0054]

Second Agent

Composition		Amount Compounded (W/V%)
No. 1	aqueous hydrogen peroxide (3.0 %)	6.7 g
No. 2	phosphoric acid	0.1 g
No. 3	methyl paraben	0.1 g
No. 4	cetostearyl alcohol 4060	0.5 g
No. 5	Alscope SP-40	0.5 g
No. 6	sarcosinate LN	0.2 g
No. 7	polyoxyethylene (8E.O.) cetyl ether	0.2 g
No. 8	Pemulene TR-2	0.3 g
No. 9	purified water	Balance

No. 5: Alscope SP-40 (aqueous solution containing  
approximately 40 % of lauryl sodium sulfate;  
commercially available from Toho Chemical Co., Ltd.)

No. 6: Sarcosinate LN (sarcosine sodium laurate;  
commercially available from Nikko Chemicals Co.,  
Ltd.)

No. 8: Pemulene TR-2 (acrylic acid · methacrylic acid alkyl  
copolymer; commercially available from Nikko  
Chemicals Co., Ltd.)

[Method of Production]

We added No. 1, No. 2 and No. 3 to approximately 50 g  
of No. 9 and dissolved it evenly (Part 1). We added No. 8

to approximately 40 g of No. 9 and dissolved it evenly while stirring. Then, we added No. 4, No. 5, No. 6 and No. 7 and heated it at approximately 80°C. We carried out slow cooling while stirring gently, added No. 9 to make up the balance making it 100.0 mL overall. We further stirred it lightly and obtained the second agent which was uniform, white and viscous.

[0055]

[Effect]

After processing the tangle of hair using the same method as in Practical Example 7 and Practical Example 8 (however, it should be noted that this was heated to approximately 40°C when the first agent was coated on), the result was a wave which was uniform and rich in resilience and the touch was significantly improved when the hair was both dry and wet.

[0056]

[Practical Example 14]

We produced heated two-bath type curling agent solution No. 1 and solution No. 2 as indicated below.

First Agent

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Composition		Amount Compounded (W/V%)
No. 1	sodium pyrosulfite	3.0 g
No. 2	urea	3.0 g
No. 3	monoethanol amine	3.0 g
No. 4	2-amino-2-methyl propanol	1.0 g
No. 5	Macote 280	3.0 g
No. 6	cationic emulsion DCQ2-7224	1.0 g
No. 7	purified water	Balance

No. 5: Macote 280 (approximately 40 % aqueous solution of copolymer of diallyl dimethyl chloride ammonium (80 %) and acrylic acid (20%); commercially available from Calgon Corp.)

No. 6: Cationic emulsion DCQ2-7224 (aqueous emulsion containing trimethyl syllyl "iseamodimeticon" [as transliterated]; commercially available from Dow Corning Inc.)

[Method of Production]

We added No. 1, No. 2, No. 3, No. 4 and No. 5 to approximately 80 g of No. 7 and stirred it until it was uniform and completely dissolved. Next, we added No. 6 and stirred it. Last of all, we added No. 7 to make up the

balance so that it was 100.0 mL overall. We obtained a first solution which was milky white and stable.

[0057]

Second Agent

Composition		Amount Compounded (W/V%)
No. 1	sodium bromate	1.00 g
No. 2	potassium phosphate	0.05 g
No. 3	disodium phosphate	0.10 g
No. 4	Alscope AP30	0.50 g
No. 5	sulfosuccinate L2Na	0.25 g
No. 6	behenyl alcohol	0.30 g
No. 7	cetostearyl alcohol	1.50 g
No. 8	polyoxyethylene (50E.O.) oleyl ether	0.20 g
No. 9	Alon A-20P	0.05 g
No. 10	purified water	Balance

No.4: Alscope AP-30 (aqueous solution containing approximately 30 g of polyoxyethylene (3E.0) lauryl sodium sulfate; commercially available from Toho Chemical Ltd.)

No. 5: Sulfosuccinate L2Na (lauryl sodium sulfosuccinate: commercially available from Nippon Oil and Fats Co.,Ltd.

No.9: Alon A-20P (sodium polyacrylate; commercially available from Toa Synthetic Chemical Co. Ltd.)

[Method of Production]

We added No. 1, No. 2, No. 3 and No. 9 to approximately 30 g of No. 10 and stirred it until it was evenly dissolved (Part 1). We added No. 4, No. 5, No. 6 and No 7 to approximately 60 g of No. 10. We heated it to approximately 80°C, subjected it to slow cooling while stirring gently until it was approximately 30°C (Part 2). We added Part 2 to Part 1 and stirred gently. We added No. 10 to make up the balance so that it was 100.0 mL overall. We continued stirring and obtained a second solution which was milky white and viscous.

[0058]

[Effect]

We coated 1 mL of the first solution onto a tangle of hair (3 g, 20 cm), wound it around an "ever rod" and coated on another 2 mm. We heated it to 40°C and set it aside so that it was still for 20 minutes. We washed in flowing water for approximately 3 minutes at approximately 40°C. We towel-dried it lightly and then coated on 3 mL of the second solution. We set it aside so that it was still for approximately 5 minutes at room temperature (25°C, 52 % RH). We removed the rod and washed it in water at

approximately 40°C. Then, we towel-dried it lightly, hung it inside the room and air-dried it. A soft wave was obtained which was loose and resilient. The wave was beautiful with outstanding touch both when dry and wet.

[0059]

[Practical Example 15]

We prepared the first agent and second agent for heated two-bath style curly hair straightening indicated as follows.

/11

First Agent

Composition		Amount Compounded (W/V%)
No. 1	thioglycolic acid ammonium (50 %)	8.8 g
No. 2	N,N'-diacetyl cysteine	1.0 g
No.3	monoethanol amine	1.3 g
No. 4	behenyl alcohol	3.0 g
No. 5	cetostearyl alcohol 4060	3.0 g
No. 6	stearyl chloride trimethyl ammonium (60 %)	0.5 g
No. 7	polyoxyethylene (15E.0.) oleyl ether	0.5 g
No. 8	Macote 295	5.0 g
No. 9	silicon SC1014M	0.5 g
No. 10	fragrance	0.1 g
No. 11	purified water	Balance



No. 8: Macote 295 (aqueous solution containing approximately 40 % of a copolymer of diallyl dimethyl chloride ammonium (95 %) and acrylic acid (5%); commercially available from Calgon Corp.

No 9: Silicon SC1014 M (glycol modified silicone: commercially available from Shinetsu Chemical Industries Ltd.)

[Method of Production]

We added No. 1, No. 2, No. 3 and No. 8 to approximately 30 g of No. 11 and stirred it until it was completely dissolved (Part 1). We added No. 4, No. 5, No. 6, No. 7 and No. 9 to approximately 40 g of No. 11 and heated this to approximately 80°C. While stirring this, we cooled it slowly to approximately 40°C and obtained a creamy base. We added No. 10 and stirred it for approximately 60 minutes (Part 2). We combined Part 1 and Part 2 and while stirring well, added No. 11 to make up the balance so that it was 100.0 g overall. Last of all, we degassed it at reduced pressure and obtained a creamy first agent.

[0060]

Second Agent

Composition		Amount Compounded (W/W%)
No. 1	aqueous hydrogen peroxide (30 %)	6.80 g
No. 2	phenacetin	0.10 g
No. 3	phosphoric acid	0.20 g
No. 4	disodium phosphate	0.05 g
No. 5	methyl paraben	0.05 g
No. 6	behenyl alcohol	3.00 g
No. 7	cetostearyl alcohol	3.00 g
No. 8	myristyl alcohol	1.00 g
No. 9	Niccol MMT	1.00 g
No. 10	polyoxyethylene (15E.0.) oleyl ether	0.50 g
No. 11	polydimethyl siloxane (20 cs)	3.00 g
No. 12	Polysta OMR	1.00 g
No. 13	purified water	Balance

No.9: Niccol MMT (M-myristyl oleyl-N-taurine sodium salt;  
commercially available from Nikko Chemicals Ltd.)

No. 12: Polysta OMR (aqueous solution containing  
approximately 25 % maleic acid · isobutylene copolymer  
sodium salt; commercially available from Nippon Oil  
and Fats Ltd.).

[Method of Production]

We added No. 1, No. 2, No. 3, No. 4, No. 5 and No. 12  
to approximately 20 g of No. 13 and stirred it until it was

completely dissolved (Part 1). We added No. 6, No. 7, No. 8, No. 9, No. 10 and No. 11 to approximately 50 g of No. 13. We homogenized these in a homomixer and while stirring it entirely, we slowly cooled it. We added this to Part 1 and continued stirring it until it was uniform. We added /12

No. 13 to make up the balance and obtained 100.0 g overall and even continued to stir it thereafter. Last of all, we degassed it at reduced pressure and obtained a creamy second agent.

[00061]

[Effect]

We bundled hair which was extremely frizzy (3.0 g, 20 cm) and prepared a tangle of hair. After washing it in a commercial shampoo, we rinsed it thoroughly and after towel-drying it we coated on 3.0 g of the first agent while combing it and spreading it thoroughly. We arranged the hair so that it was standing up straight and set it aside so that it was still for 15 minutes at 40°C. We washed it for 3 minutes in flowing water at approximately 40°C and towel-dried it. Then, we coated on 3.0 g of the second agent while combing and spreading it thoroughly. We arranged the hairs so that they stood up straight and set

it aside for 5 minutes at room temperature (24°C, 65 % RH) so that it was still. We washed it thoroughly in flowing water of approximately 40°C, towel-dried it and then hung it in the room and air-dried it. The frizzy hair had become completely straight and was quite smooth and resilient both when dry and when wet and its luster was confirmed to have been improved.

[0062]

[Effect of Invention]

The present invention provides a composition for permanent wave or curly hair straightening which makes hair smooth when wet and when dry after treating with a permanent wave and curly hair straightening and with significantly improved moistness when the dry hair is touched.